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NEW AMERICAN SPECIES OF THE GENUS ATAX (FAB.) BRUZ.¹

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THE author had the pleasure of presenting at the annual meeting of the Nebraska Academy of Sciences, November 27, a paper embodying the results of a study of this genus. In it were embraced the descriptions of seven new species, and, since the printed report of the society's proceedings will not appear for a few months, it is deemed desirable to publish at once descriptions which will be sufficient for ready identification, and will preclude the possible publication of synonyms.

The collections studied were made in twelve localities in Michigan, one in Wisconsin, five in Nebraska, and two in New York, the latter by Mr. R. H. Johnson, of Harvard College, and through his kindness transmitted to the author, who also acknowledges the assistance of Mr. Bryant Walker, of Detroit, Mich., in the identification of the mussels, and his indebtedness to Dr. F. Koenike, of Bremen, Germany, for specimens of European species. The collections involved the examination of 1125 specimens of Unionidae, belonging to 36 species, and resulted in the preservation of 4500 mites, divided among 12 species, of which 7 are new and of which 2 more are recorded for the first time from this country.

The species represented are *A. crassipes* (Müller), *A. pectinatus* n. sp., *A. intermedius* (Koenike), *A. abnormipes* n. sp., *A. indistinctus* n. sp., *A. serratus* n. sp., *A. fossulatus* (Koenike), *A. stricta* n. sp., *A. arcuata* n. sp., *A. ypsilophorus* (Bonz), *A. tumidus* n. sp., and *A. ingens* (Koenike). The validity of the genus *Cochleophorus* Piersig is recognized and the species referred to it excluded from this paper. The new species may be characterized as follows :

¹ Studies from the Zoölogical Laboratory, The University of Nebraska, Lincoln, under the direction of Henry B. Ward, No. 23.

I. *A. pectinatus* n. sp.

Related to both *A. crassipes* (Müller) and *A. figuralis* (Koch), and bearing resemblances to each, but rather closer to the latter than to the former. Of the form of *A. figuralis*, but smaller, the males averaging .7 mm., the females .8 mm. in length; legs somewhat shorter, the first pair shorter than the body, the second and third about one fourth longer, and the fourth two thirds longer. No spines on first pair of legs set into the side of projecting sockets, and all the spines shorter than those of *A. figuralis*. Palpi much thicker than first pair of legs and very long, equalling one third the length of the body; chitinous papillae one fourth segment short. Claw of



FIG. 1. — *A. pectinatus*
♂ — distal segment
first pair of legs. ×
about 165.

first pair of legs peculiar, being expanded dorso-ventrally and flattened laterally, forming a broad plate, the ventral margin of which is deeply pectinate, thus suggesting the specific name (Fig. 1). Claws of the other legs long, slender, and simple. Sexual area of female similar to that of *A. crassipes*, — three acetabula on each of four plates; in the male the two plates on either side united into one, upon which the six acetabula are arranged in two groups of three.

A free-swimming form, of which six specimens were dredged in Lake St. Clair, Mich., over a bed of *Chara*, at depths of from six to twelve feet.

II. *A. abnormipes* n. sp.

A small species, the body of the male pyriform in shape, deeply emarginate posteriorly, .5 mm. long; of the female very slightly pyriform, with the posterior margin rounded, .6 to .7 mm. long. Surface of the body marked by lines dividing it into minute hexagonal areas. Palpi rather slender, somewhat less than half the length of the body, with a long fourth segment and a broad fifth segment, the lateral surface of which is quadrate in outline with the ventral distal angle produced, and the distal margin with two curved claw-like projections (Fig. 2).

The epimera cover most of the under surface of the body, leaving but a narrow space between the second and third, and between those of opposite sides. Legs short and thick, the fourth pair longest and only one fifth longer than the body; those of the female slenderer and relatively even shorter than those of the male. The three distal segments of the fourth leg of the male are peculiarly modified, the fourth being compressed laterally through the distal two fifths of its length, and in this compressed portion a bunch of six very large spines, exceeding in length the fifth segment, in two rows on the anterior surface, and on the posterior surface about nine moderately stout spines; the fifth segment is short, at its base narrower than the preceding segment, tapering toward the tip, with two very heavy, curved blunt spines on the extensor surface and a row of spines along the flexor side, and with a bunch of fine hairs at the distal end; the sixth is very slender and rather long. The claws are strongly bent and with an accessory tip on the convex side at a distance from the principal tip equalling one sixth the total length. One half of the sexual area of the male is situated on either face of the groove in the posterior surface, the opening being at its bottom; the acetabula are five, in two groups—two anteriorly, three posteriorly—on a single plate. In the female this plate is divided, the posterior portion with three acetabula being the larger.

Of this species over 500 specimens have been collected from a number of species of *Unio*, at Lake St. Clair and Grand Rapids, Mich., Oshkosh, Wis., Chautauqua and Cheektowaga, N.Y.

III. *A. indistinctus* n. sp.

With the preceding and the following this species forms a group of three closely allied species. Of this form only females have been collected, so that there is an absence of the marked structural peculiarities which the males of the others possess, but differences exist sufficient to separate these from

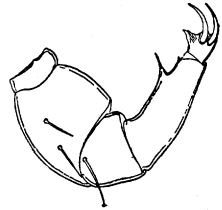


FIG. 2. — *A. abnormipes* ♀ — outer side left palpus. × about 125.

the females of the other species. The body is regular in outline and measures about .8 mm. in length, with the same division of the surface into areas as in *A. abnormipes*. The palpi are relatively stouter (Fig. 3), while the epimera cover, as in that species, most of the ventral surface. The legs are relatively long and moderately stout, the fourth two fifths longer than the body, while the accessory tip on the claw is one third the length from the distal end. Each lateral sexual plate is in two parts, with the acetabula three and six, respectively; in one instance four and five on one side, three and six on the other.

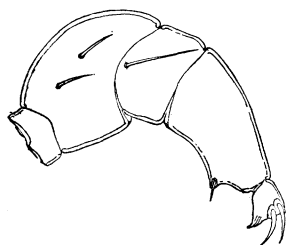


FIG. 3. — *A. indistinctus* ♀ — outer side right palpus. × about 125.

Specimens were taken at Lake St. Clair, Mich., and confused with the following species until mounted and subjected to a careful microscopical examination, when the differences became apparent.

IV. *A. serratus* n. sp.

The third and largest member of this group just referred to, averaging in length about 1.1 mm., and with a regular outline. Surface of the body marked as in preceding forms. The palpi are relatively much stouter (Fig. 4), while the legs are a trifle more slender and not so long proportionately. The fourth leg is only one eighth longer than the body in the male, and in the female, where all the legs are shorter, it is even less than the body length. In the male a larger or smaller number of the stouter spines on all the legs are serrate along both margins; on only the basal segment of the first, on each successive leg more, till on the fourth are serrate spines on each segment, and on the distal segment is a row of very prominent, flattened,

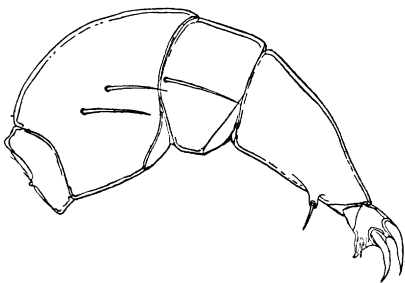


FIG. 4. — *A. serratus* ♂ — outer side right palpus. × about 125.

lanceolate spines with both edges sharply serrate. On the fourth segment of the posterior legs are three heavy club-shaped spines. In the females serrate spines are present, but less numerous and not so prominent. The claws have the accessory tip at two thirds the distance from the base. The epimera cover only the anterior two thirds of the ventral body surface, and the spaces between them are wider. The sexual area is broader than long, and in both sexes there are two plates on either side, in the male the number of acetabula varying from 12 and 25, respectively, to 15 and 31, in the female from 8 and 12 to 6 and 17.

Twenty-eight specimens from Lake St. Clair and Grand Rapids, Mich., and Cheektowaga, N.Y., taken from *Unio occidentalis* Lea, *U. coccineus* Hild., *U. undulatus* Barnes, and *U. alatus* Say.

A. fossulatus (Koenike).¹

The male differs from the female described by Koenike in the greater length of the legs in proportion to the length of the body, the somewhat larger epimera and narrower spaces between them, and in the fact that the acetabula are placed on two plates, one on either side of the sexual opening, instead of being imbedded in the surface of the body.

V. *A. stricta* n. sp.

With the preceding were collected numbers of an *Atax*, which apparently was *A. fossulatus*, differing on ordinarily close observation only in the fact that the five acetabula were in one line, instead of the two posterior being side by side. At first looked upon as males of *A. fossulatus*, the contrary was only perceived when careful microscopical examination of mounted specimens revealed the true males of that species and led to a minute examination of several specimens. The differences are found to be slight, but constant. The body is broader and averages less in length, the legs are slighter, the distal

¹ Koenike, "Nordamerikanische Hydrachniden." *Abhdlgn. d. naturwiss. Ver. Bremen*, Bd. xiii, Heft 2, p. 221, Taf. 111, f. 68-71. 1895.

segments are nearly uniform in thickness from base to tip, instead of tapering as do those of *A. fossulatus*, and the first pair are hardly stouter than the others, while in *A. fossulatus* they are considerably heavier. The claws are relatively longer and slenderer, and all but those of the first pair seem to be simple instead of bifid. The epimera are relatively shorter and broader, and the acetabula are placed one behind the other in two curved lines, as referred to above.

This species has been taken at Grand Rapids, Mich., and Milford and Lincoln, Neb., — 176 specimens altogether, — and the Nebraska specimens are peculiar in that the acetabula are smaller and more closely crowded together, while the whole sexual area is smaller than in the Michigan specimens.

The writer has been uncertain whether this is a distinct species or a variety of *A. fossulatus*, but for the present, at least, has decided to consider it as separate, though closely allied.

VI. *A. arcuata* n. sp.

This species is equal in size to *A. fossulatus* and *A. ypsilophorus*, between which it seems to be intermediate, and is of the same elongated elliptical form. The palpi resemble very closely those of *A. ypsilophorus*, as do also the epimera in size and relationship to each other. The legs are very long, in the male the fourth nearly half as long again as the body; they

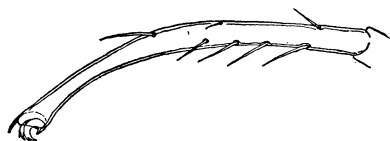


FIG. 5. — *A. arcuata* ♀ — anterior surface distal segment, posterior pair of legs. × about 125.

are slender and the spines are small and weak, while they are characterized especially by the curved form of the terminal segment, the curvature being only moderate in the first pair, but in

the fourth amounting to a deflection of 30°. The distal segment also tapers toward the tip, but just at the tip is broadly expanded to receive the short, thick, bifid claw (Fig. 5). The sexual area is toward the tip of the body and resembles very closely in structure that of *A. tumidus*; the general proportions are about those of *A. ypsilophorus*, but

the acetabula, instead of being toward the margin, are over the greater part of the plate, and are larger than in that species, while in the middle of the outer margin, on either side, are two much larger than any of the rest. The number of acetabula in the male varies from 25 to 30, in the female from 30 to 35.

Two hundred and ninety-five specimens were obtained at Charlevoix and Grand Rapids, Mich., in various species of *Unio*.

VII. *A. tumidus* n. sp.

Very similar to *A. ingens*¹ in form and size, the females of both showing a tendency to enormous distension when filled with eggs, in the relative length of the legs, in the habit of depositing these in loose masses in the mantle and gill cavities, and also in color, the internal structure of each suggesting no trace of the Y-shaped mark, but the color being a light brown with numerous fine white vermiculate lines. The palpi are very similar in the thickness of the fourth segment and in the presence of four inconspicuous papillae at the tip. The legs are feeble in proportion to the size of the body, as are those of *A. ingens*, but, unlike that species, the claws are not simple, but are of the type of *A. ypsilophorus*, though relatively much smaller and heavier (Fig. 6). The sexual area also shows a marked difference from that of *A. ingens* and agrees in position, form, number of acetabula, etc., almost precisely with that described for *A. arcuata*.

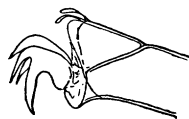


FIG. 6. — *A. tumidus* — distal end of distal segment, fourth pair of legs. $\times 280$.

Taken at Lake St. Clair, Ann Arbor, Charlevoix, Intermediate Lake, and Grand Rapids, Mich., in *Margaritana deltoidea* Lea, *Anodonta fragilis* Lam., *A. edentula* Say, and *A. ovata* Lea, thus an *Anodonta* parasite, while *A. ingens* is a *Unio* dweller. Few specimens were taken in any one locality.

¹ Koenike, *l.c.*, p. 219, Taf. III, f. 65-67.